

MODERN TECHNOLOGIES FOR IN-SITU LEACHING URANIUM MINING (KAZ/3/002)

B1 New

MODEL PROJECT

CORE FINANCING

YEAR	Experts		Group Activity		Equipment		Fellowships		Scientific Visits		Group Training		Sub-Contracts		Misc. Comp.		TOTAL
	m/d	US \$	US \$	US \$	m/d	US \$	m/d	US \$	m/d	US \$	US \$	US \$	US \$	US \$	US \$	US \$	
1997	3.10	44,000	0	7,000	0/0	0	0/14	4,480		49,280	0	0	0	0	0	0	104,760
1998	2.17	35,805	0	100,000	0/0	0	0/14	4,760		27,900	0	0	0	0	0	0	168,465
1999	0/0	0	0	0	0/0	0	0/0	0		29,400	0	0	0	0	0	0	29,400

First Year Approved: 1997

OBJECTIVES: The development goal is to render uranium production environmentally acceptable while preserving or improving its profitability and sustainability. The specific objective is to conduct engineering tests and demonstrations that will lead to widespread introduction of modern technologies for *in-situ uranium leaching* with minimum impact on groundwater and environmental quality.

BACKGROUND: Kazakhstan is the world's fifth largest producer of uranium, much of it by in-situ leaching (ISL) with sulphuric acid. Present practice, which does not include either groundwater restoration or environmental remediation, has become increasingly unacceptable. As environmental costs begin to figure in policy making, pressure is mounting to enforce environmental controls more vigorously on the extraction process. Countries that have used ISL without undertaking reclamation during operation are now facing major environmental problems. It has become essential to adopt production practices that balance economic, environmental and technological factors. The Government has therefore requested the Agency's assistance in selecting and introducing improved technology for in-situ uranium leaching. In question are engineering and economic choices related to (i) the most economical way to recover uranium by ISL; (ii) the best method of conducting site reclamation during mining operations; and (iii) co-ordinating and harmonizing the roles of mine operators and regulators to maximize both efficient resource utilization and environmental protection.

PROJECT PLAN: A key feature of the project is the joint involvement of regulatory authorities, reclamation specialists, and the national mining company in planning and implementation. These interests are represented respectively by the Atomic Energy Agency of the Republic of Kazakhstan, Volkovgeologia, and KATEP. During the project's first phase, the principal activities will consist of test site selection and characterization. Criteria for site selection will include lack of previous mining activity; an economic uranium deposit at less than 300 m below ground; conditions representative of the main mining region; access; and reasonable infrastructure. Site characterization will consist of gathering and interpreting basic data on the rock type, aquifer characteristics, and size and quality of the uranium reserves. The second phase will include engineering and technical studies leading to selection of optimal technology for drilling, water flow control, and reclamation. An example of alternatives to be studied is the choice between sulphuric acid and carbonate brine as the leaching fluid. Leaching with carbonates, if feasible, would reduce considerably environmental and aquifer damage. The project's third phase will address rehabilitation of the aquifer after mining stops. This phase will consist mainly of a demonstration of reverse osmosis technology for water purification, coupled to development of a hydrological model for managing water flow. Another important dimension of the project lies beyond the strictly technical realm. The project will bring together three important entities, regulators, mine operators, and reclamation specialists, with the goal of helping them understand each other's capabilities and limitations. Effective interaction among them is the key to improving economic performance while preserving environmental quality.

NATIONAL COMMITMENT: The participating institutions will implement the project. They will provide (i) technical support during site selection; (ii) the equipment and personnel to drill 5-8 test holes for evaluating alternative extraction techniques; (iii) operational monitoring during engineering tests; and (iv) operational support during the groundwater restoration phase. A joint management team, consisting of senior staff from the participating entities, will be responsible for supervision and coordination.

AGENCY INPUT: The Agency will furnish expertise and expert services; a reverse osmosis unit for aquifer restoration; equipment and software for data collection and analysis; training courses; and scientific visits.

PROJECT IMPACT: The project will demonstrate the economic and environmental advantages of introducing modern practices into the recovery of uranium by ISL extraction. Ancillary benefits will include an evaluation of the feasibility of replacing the sulphuric acid leaching agent with the more benign carbonate brines. The project

design reflects the belief that a clear demonstration of modern techniques for ISL extraction of uranium will lead to both better economic returns and effective environmental preservation. This will involve introducing methods of environmental accounting into national planning. In turn, these methods will improve policy decisions regarding, for example, the optimum degree of aquifer restoration. Setting an unrealistically high goal for aquifer quality following remediation would introduce serious economic disincentives, just as would a failure to take the costs of environmental damage into account. Finally, making the right technical choices to optimize both profitability and environmental protection will have important implications for other countries in the region.